MATERIAL SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

National Institute of Standards and Technology
Standard Reference Materials Program
100 Bureau Drive, Stop 2320
Gaithersburg, Maryland 20899-2320

SRM Number: 2717a
MSDS Number: 2717a
SRM Name: Sulfur in Residual Fuel Oil (Nominal Concentration: 3 %)

Date of Issue: 16 May 2006

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Description: Standard Reference Material (SRM) 2717a has a nominal sulfur mass fraction of 3 %. SRM 2717a consists of 100 mL of commercial "No. 6" residual fuel oil.

Substance: Residual Fuel Oil No. 6

2. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS[1]

Component: **Fuel Oil No. 6**

Other Designations: **Fuel Oil No. 6** (Bunker C Oil; No. 6 Fuel Oil; Grade 6)

CAS Number: 68553-00-4
EC Number (EINECS): 271-384-7

SRM Nominal Concentration (mass %): 100

EC Classification: Carcinogen Category 2
Danger/Hazard Symbol: T
EC Risk (R No.): 45
EC Safety (S No.): 45, 53

[1] Hazardous components 1 % or greater; Carcinogens 0.1 % or greater are listed in compliance with OSHA 29 CFR 1910.1200.

3. HAZARDS IDENTIFICATION

NFPA Ratings (Scale 0–4): Health = 1 Fire = 2 Reactivity = 0

Major Health Hazards: Suspect cancer hazard in animals.

Physical Health Hazards: Combustible liquid and vapor.

Potential Health Effects

Inhalation: Inhalation hazard is low unless heated or misted. High concentrations of vapor or mist may cause irritation and possible symptoms of central nervous system depression. Prolonged inhalation of fumes or mist may cause irritation.

Skin Contact: Contact may cause mild irritation and redness. Repeated or prolonged contact may cause dermatitis or rash.

Eye Contact: Eye contact may cause a slight irritation.

Ingestion: Ingestion may cause gastrointestinal irritation. No data is available for chronic exposure.

Listed as a Carcinogen/ Potential Carcinogen: **Fuel Oil No. 6**

Yes	No	
X		In the National Toxicology Program (NTP) Report on Carcinogens.
	X	In the International Agency for Research on Cancer (IARC) Monographs.
	X	By the Occupational Safety and Health Administration (OSHA).

4. First Aid Measures

Inhalation: If adverse effects occur, remove to uncontaminated area. Give artificial respiration, if not breathing, by qualified personnel. Get immediate medical attention.

Skin Contact: Rinse affected area with copious amounts of water for at least 15 minutes while removing contaminated clothing. Get medical attention, if needed.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Get immediate medical attention.

Ingestion: Get immediate medical attention.

5. Fire Fighting Measures

Fire and Explosion Hazards: Fuel Oil No. 6 is a moderate fire hazard. Vapors are explosive above flash point.

Extinguishing Media: Regular foam. Regular dry chemical. Carbon dioxide. Water.

Fire Fighting: Move container from fire area if it can be done without risk. Use water spray to cool containers until well after the fire is out and to discharge vapors. Wear full protective clothing and NIOSH-approved self-contained breathing apparatus (SCBA).

Flash Point: 73.12 °C [(a)]
Method Used: PMCC (ASTM D93-94)

Autoignition Temp.: Not available.

Flammability Limits in Air
UPPER (Volume %): 5
LOWER (Volume %): 1

[(a)] Value obtained from physical tests and measurements of SRM 2717a.

6. Accidental Release Measures

Occupational Release: Avoid heat, flames, sparks, and other sources of ignition. Reduce vapors with water spray. Collect small spilled material, after absorbing with sand or other non-combustible material, in an appropriate container for disposal. For large spills, stop leak if possible without personal risk. Keep out of water supplies and sewers.

Disposal: Refer to Section 13, "Disposal Considerations".

7. Handling and Storage

Storage: Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.106. Keep separated from incompatible substances.

Safe Handling Precautions: See Section 8, "Exposure Controls and Personal Protection".

8. Exposure Controls and Personal Protection

Exposure Limits: **Fuel Oil No. 6 (mineral oil mist)**

OSHA (PEL): 5 mg/m^3 TWA
ACGIH: 5 mg/m^3 TWA
ACGIH: 10 mg/m^3 STEL
NIOSH: 5 mg/m^3 recommended TWA (10 h)
NIOSH: 5 mg/m^3 recommended STEL

Ventilation: Use local exhaust ventilation system. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Ensure compliance with applicable exposure limits.

Respirator: If necessary, refer to the "NIOSH Guide to the Selection and Use of Particulate Respirators Certified under 42 CFR 84" for selection and use of respirators with organic vapor cartridges certified by NIOSH.

Eye Protection: Wear safety goggles. An eye wash station should be readily available near areas of use.

Personal Protection: Wear appropriate protective clothing and chemically resistant gloves to prevent skin exposure.

9. PHYSICAL AND CHEMICAL PROPERTIES

Component: **Fuel Oil No. 6**
Appearance and Odor: Liquid to heavy paste. Black. Odor.
Boiling Point: > 177 °C
Freezing Point: Not available.
Density (@ 15 ºC): 0.99118 g/L [(a)]
Kinematic Viscosity: 540.2×10^{-6} m^2/s (@ 40 °C) [(a)]
282.0×10^{-6} m^2/s (@ 50 °C) [(a)]
Water Solubility: Insoluble.

[(a)] Value obtained from physical tests and measurements of SRM 2717a.

10. STABILITY AND REACTIVITY

Stability: X Stable ____ Unstable

Stable at normal temperatures and pressure.

Conditions to Avoid: Avoid heat, flames, sparks, and other sources of ignition. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers. Avoid contact and inhalation of material or combustion by-products.

Incompatible Materials: Oxidizing materials.

Fire/Explosion Information: See Section 5, "Fire Fighting Measures".

Hazardous Decomposition: Thermal decomposition can produce oxides of sulfur and oxides of carbon.

Hazardous Polymerization: ____ Will Occur X Will Not Occur

11. TOXICOLOGICAL INFORMATION

Route of Entry: X Inhalation X Skin X Ingestion

Toxicity Data: **Fuel Oil No. 6**
Rat, Oral LD_{50}: 5 100 mg/kg
Rabbit, Skin LD_{50}: > 5 mL/kg

Health Effects (Acute and Chronic): See Section 3, "Hazards Identification" for potential health effects.

12. ECOLOGICAL INFORMATION

Ecotoxicity Data: Not available.

13. DISPOSAL CONSIDERATIONS

Waste Disposal: Dispose in accordance with all applicable federal, state, and local regulations.

14. TRANSPORTATION INFORMATION

U.S. DOTand IATA: Not regulated by DOT or IATA.

15. REGULATORY INFORMATION

U.S. Regulations: SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):

ACUTE:	No.
CHRONIC:	Yes.
FIRE:	Yes.
REACTIVE:	No.
SUDDEN RELEASE:	No.

State Regulations: California Proposition 65: Soot, tars, and mineral oils are known to the state of California to cause cancer (Feb., 1987).

CANADIAN Regulations

WHMIS Classification: Not determined.

EUROPEAN Regulations

EC Classification (assigned): Carcinogen Category 2

T Toxic.

EC Risk Phrases: R 45 May cause cancer.

EC Safety Phrases: S 45 In case of accident, seek medical advice immediately and show label where possible.

S 53 Avoid exposure.

National Inventory Status

U.S. Inventory (TSCA): Listed on inventory.

TSCA 12(b) Export Notification: Not listed.

16. OTHER INFORMATION

Sources: MDL Information Systems, Inc.; MSDS *Fuel Oil No. 6*, 16 June 2005.

Disclaimer: Physical and chemical data contained in this MSDS are provided only for use as a guide in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data in the MSDS. The certified values for this material are given in the NIST Certificate of Analysis.